

CLAIMS

What is claimed is:

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1. An apparatus for filtering and separating fluids, comprising: a pressure tight housing having a fluid inlet, a retentate outlet and a permeate outlet, a plurality of stacks of membrane filter elements arranged in said housing adjacent one another and being joined such that said fluid is conducted through said stacks of membrane filter elements in a series flow pattern, each stack including a plurality of spaced filter elements in the form of membrane pillows arranged in spaced relationship around which fluid flow is conducted in a meander-like pattern through each to stack.
 2. An apparatus according to claim 1, wherein each of said stacks includes a closed space in which said membrane pillows are contained and each includes further an inlet for conducting said fluid into said closed space and outlets for conducting said fluid out of said closed space, said stacks being arranged adjacent one another such that the outlet of one stack is in communication with the inlet of the next adjacent stack.
 3. An apparatus according to claim 2, wherein separating elements are disposed between adjacent stacks delimiting said spaces, and said inlets and outlets are formed in said separating elements.

4. An apparatus according to claim 2, wherein said inlets and said outlets are slots formed in said separating elements.

5. An apparatus according to claim 1, wherein said membrane pillows are essentially oblong in shape.

6. An apparatus according to claim 3, wherein said membrane pillows are arranged in said stack in a longitudinally displaced fashion such that each alternate membrane pillow has one end projecting from said stack and disposed in engagement with the adjacent separating element thereby forming flow reversal areas at each end of said stack between the projecting ends of two alternate membrane pillows.

7. An apparatus according to claim 1, wherein each membrane pillow includes a planar stabilizing element disposed between outer membrane elements.

8. An apparatus according to claim 7, wherein spacer elements provided with elastomer sealing elements are disposed between adjacent membrane pillows.

9. An apparatus according to claim 8, wherein said sealing elements are O-rings.

10. An apparatus according to claim 5, wherein said membrane pillow are oblong and each includes at least two permeate discharge openings.

11. An apparatus according to claim 10, wherein said discharge openings are arranged along the longitudinal center axis of each membrane pillow and at different distances from the opposite ends thereof.

12. An apparatus according to claim 1, wherein said stacks have an essentially oblong cross-section.

13. An apparatus according to claim 2, wherein said stacks are formed by two essentially semi-circular stack shells which are joined to form within a space of oblong cross-section and which enclose therein said stacks of membrane pillows, which also have an oblong shape.

14. An apparatus according to claim 13, wherein said housing is closed at opposite ends by closure elements and at least one of said stack shells includes a permeate discharge channel extending longitudinally through said at least one stack shell and being disposed in communication with permeate discharge openings formed in said closure elements.

15. An apparatus according to claim 14, wherein the space defined within said stack shells has an oblong cross-section.

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